TRANSPORTATION

Challenge

The use of petroleum fuels for transportation contributes to regional air quality degradation. Further, the cost of fuel fluctuates and depends on its availability from foreign sources. How does Fort Carson reduce its transportation-related impacts on the air while meeting transportation needs?

Key Considerations

- **Community Pattern Transportation** – Air pollution is a function of miles traveled and vehicle use. Commuting options can reduce regional pollution due to transportation.
- **Fuel Efficiency** – The types of vehicles used in commuting and mission activities directly impacts air quality. Fuel efficient vehicles create less pollution.
- **Alternative Technologies** – Alternative fuels and new motors can reduce petroleum fuel consumption.

TRANSPORTATION

Importance to Fort Carson

Mission – Deployment and safe transportation of troops to the Installation and to the training grounds are essential to Fort Carson's mission to train, mobilize, and deploy Army ground forces in defense of the nation.

Quality of Life – Good quality of life depends on having convenient modes of transportation and clean air for the soldiers, their families, and people in the community. Workers who commute to Fort Carson travel an average of 12,750 miles per year.

Cost – The Installation spends a yearly average of $40,000 on gasoline; $130,000 on diesel distillate; and $1,400,000 on tactical fuels (JP-8).

Environment and the Community – While Fort Carson and the surrounding area are in an attainment area (violations of national air quality standards have not lasted longer than one day in the previous year), double-digit population growth in the region will affect the way Fort Carson's air permits are handled in the future. Additional people and vehicles will cause Fort Carson's permit limits to drop, affecting the method in which training is executed.

While there have been no air-related environmental enforcement actions at Fort Carson in the past five years, there are several other critical considerations when evaluating long-term transportation issues.

The Army's Tank-automotive and Armaments Command (TACOM) constantly works on innovative alternative technologies for Army systems. Influence on Army systems is most effective when sent through proper channels. Currently, the Directorate of Environmental Compliance and Management (DECAM) is working through the proper channels to elevate issues concerning tactical and fleet vehicles and ways to improve their use and repair.

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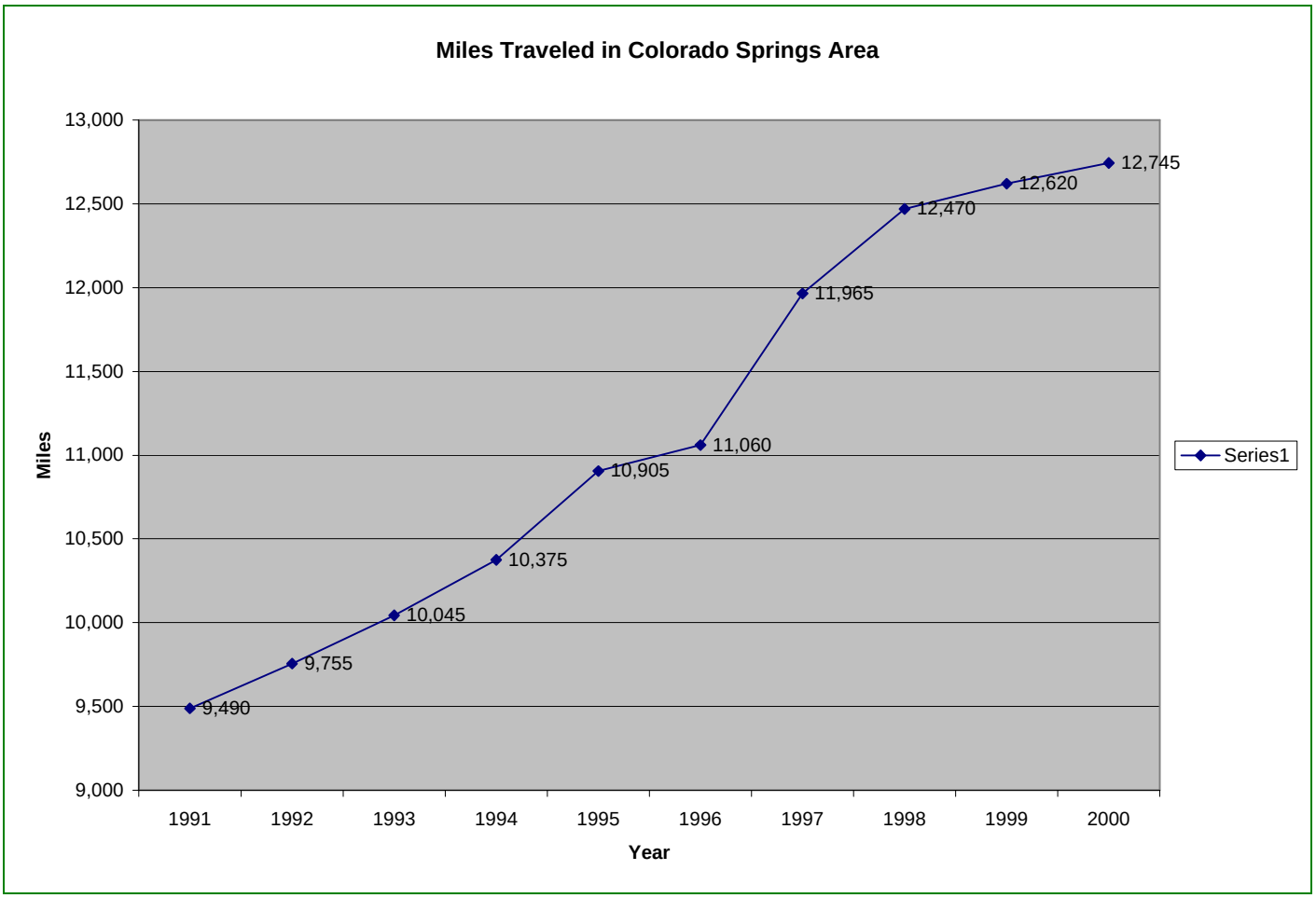
Introduction

To accomplish its mission of training combat-ready forces, Fort Carson accommodates a population of 106,600 personnel and family members, 458 armored tactical vehicles, and numerous administrative and support vehicles. The fuel currently used to power those vehicles is nonrenewable; this is not a cost-effective or sustainable approach. Furthermore, fossil fuels add pollutants such as carbon monoxide and nitrogen dioxide to the atmosphere. In an area that is close to nonattainment status for many air pollutants and whose population is expected to grow 37 percent by 2025—according to the Pikes Peak Area Council of Governments (http://www.ppacg.org/25draftplan.htm)—alternatives that reduce pollutants caused by transportation activities will be needed. It is also in the country's best interests to reduce dependence on foreign sources of fuel. Figure 4.1 shows the increase in vehicle-miles traveled in the Colorado Springs area over the past nine years. More information on mobility data for Colorado Springs can be found at http://mobility.tamu.edu/ums/study/mobility_data/tables/colorado_springs.pdf.

Figure 4.1 – Vehicle Miles Traveled in Colorado Springs Area



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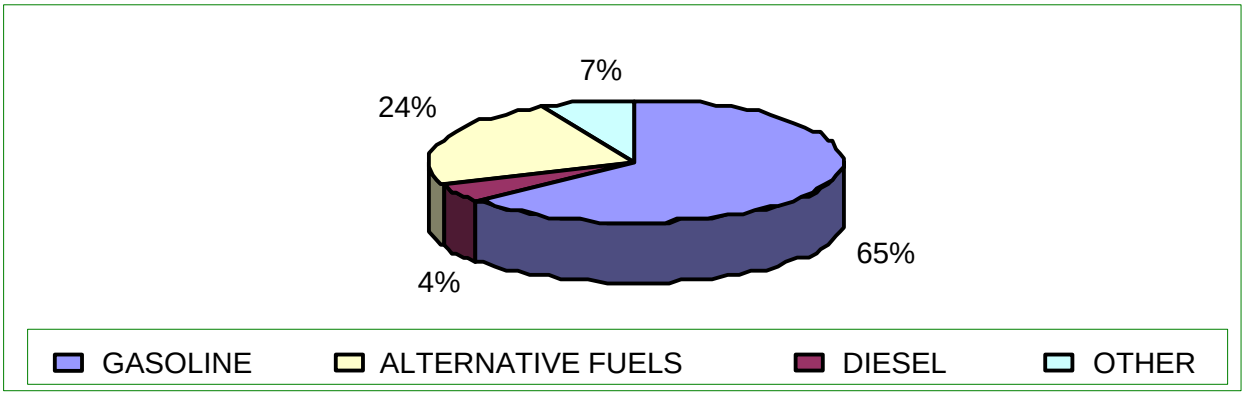
Background

Military vehicles vary in gas mileage. Vehicles with better mileage provide increased soldier safety during wartime maneuvers because an armored division followed by fuel tankers and supplemented by helicopters leaves a large footprint, which increases vulnerability to attacks on back-up logistics (tankers, etc.). Unfortunately, the substantive weight of armored vehicles and the large turbine engines that provide good mobility (up to 45 miles per hour) result in vehicles with low mileage. However, the weight and mobility of these vehicles protect soldiers and help win wars.

The government has made progress in fuel economy research. In October 2001, the Defense Energy Support Center contracted for a long-term supply of biodiesel. In addition, the Army's National Automotive Center has been working to expand use of hybrid propulsion systems in military ground vehicles. The Army is also working on a program to design a common engine for two major battle systems, including the main battle tank, which will save fuel and reduce operations and support required for the tank engine. The Department of Defense (DOD) and the Army have demonstrated that they recognize the need to reduce both dependence on foreign sources of fuel and air pollution. They are working to incorporate technologies to address these issues in their operations.

Most of the administrative vehicles on the Installation are standard fossil fuel vehicles (Figure 4.2). Many are Army-owned vehicles that are maintained long past the time when most consumers would have traded them in for newer vehicles. DECAM owns several alternatively fueled vehicles that run on gasoline or ethanol. These vehicles have been used successfully for over five years. As the largest fleet operator in the nation, the Federal government has the greatest opportunity to provide market incentives for development and manufacture of alternatively fueled vehicles and the infrastructure to support them. In fact, Executive Order 12844, entitled "Federal Use of Alternative Fueled Vehicles" requires it by reinforcing federal statutes, dependent on availability from the General Services Administration.

Figure 4.2 – Administrative Vehicle Fuel Types at Fort Carson (percent)

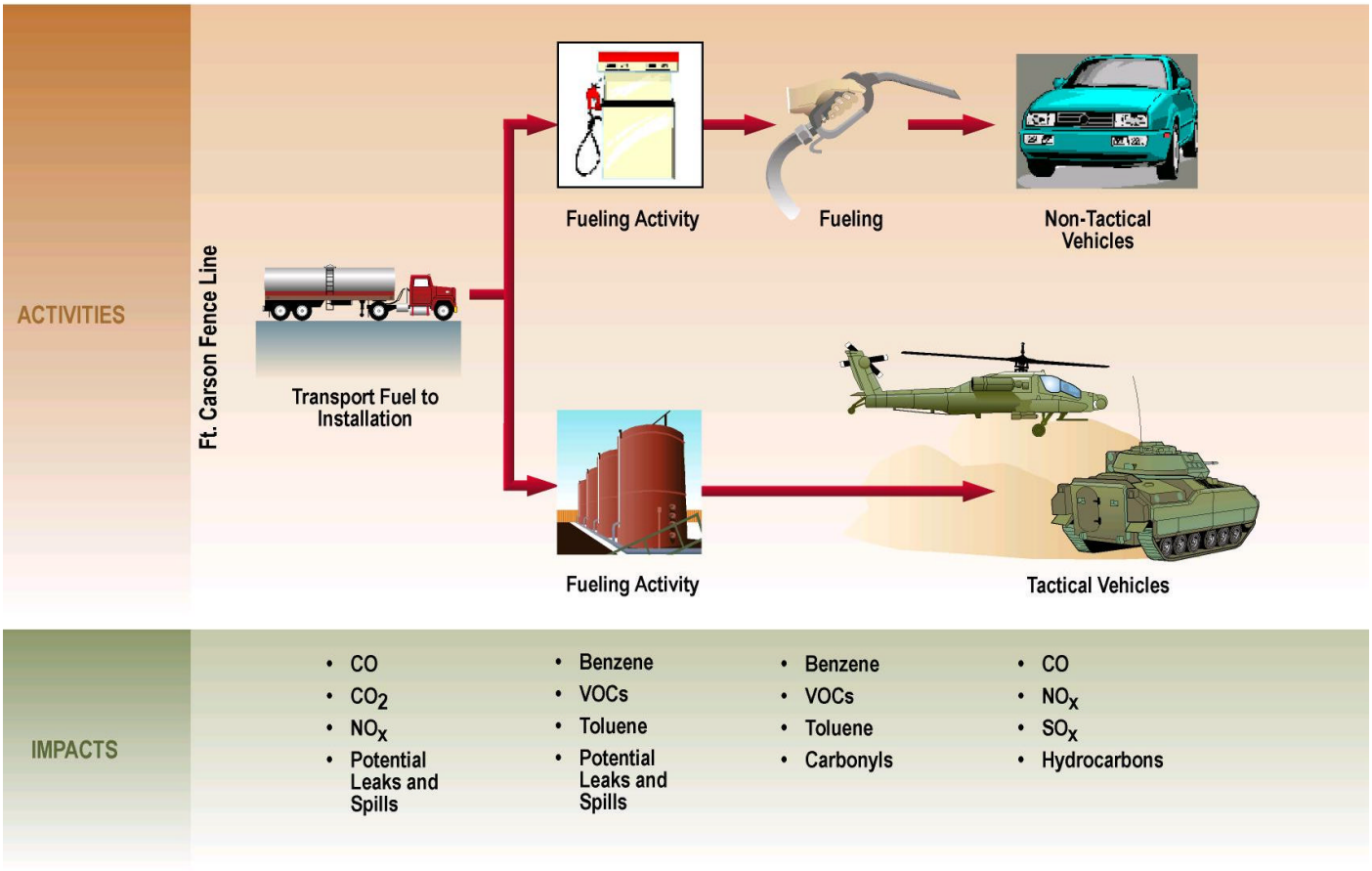


Helicopters allow commanders to move troops over long distances, observe enemy positions, evacuate wounded soldiers, and attack targets that are difficult for ground-based weapons to address. The Aviation Restructure Initiative will provide for the elimination of a number of helicopters and combine types to streamline maintenance. Currently, the U.S. Army Aviation Force Modernization Plan is addressing issues concerning helicopters in the Army and modernization of its fleet, with a primary goal of reducing costs.

Activities and Impacts

Fort Carson cannot accomplish its mission of training, mobilizing, and deploying combat-ready troops without fuel to move vehicles, material, troops, and equipment. Personnel and items need to arrive at their destinations safely and efficiently. Figure 4.3 provides a generic look at major transportation activities and some of the pollutants generated.

Figure 4.3 – Transportation Activities and Impacts



The Human Perspective

The evaporation and combustion of gasoline release toxic, smog-forming, and cancer-causing pollutants including volatile organic compounds, nitrogen oxides, benzene, 1,3-butadiene, carbon monoxide, and sulfur

dioxide. Many air pollutants cause cancer, and many of the carcinogens found in cigarettes are also found in vehicle exhaust fumes (cadmium, benzene, etc.). Air pollutants exacerbate heart disease, respiratory disorders—including asthma and bronchitis, and other health problems. In 2001, the National Center of Health Statistics reported that chronic lower respiratory conditions are the fourth leading cause of death in America (http://www.cdc.gov/nchs/fastats/deaths.htm). The relationship between asthma and vehicle emissions was demonstrated in Atlanta during the 1996 Olympic Games when the city of Atlanta provided extra public transit and blocked off downtown to automobile traffic; asthma-related emergency room visits among children in the area dropped by 42 percent (http://www.cdc.gov/od/oc/media/pressrel/r010221.htm).

Beyond the Pikes Peak Region

The United States is the world's largest emitter of carbon dioxide, the most significant greenhouse gas. If all other countries emitted carbon dioxide at the same rate as the United States, global warming would occur faster.

The World Health Organization points to respiratory disease as the leading cause of death among children worldwide. Many developing nations do not use even rudimentary emission controls on vehicle engines; it is clear that the U.S. needs to take the lead in reducing air pollution emissions from transportation sources.

Fossil fuel use damages the environment in several ways beyond vehicle emissions. The heavy equipment used to explore for, extract, and transport fossil fuels damages ecosystems. Transportation of fossil fuels adds to air pollution and spills, which also damage the environment. Pipelines disrupt ecosystems during construction and use. Demand for reliable, inexpensive sources of oil has led to wars and tensions between countries. The Gulf War resulted in marine environmental damage in the Persian Gulf, pollution from burning oil wells, and desert ecosystem damage due to movement of tanks and other heavy equipment.

Current Sustainability Activities

Purchase of Alternatively Fueled Vehicles – Currently, 24 percent of the administrative vehicles on the Installation are powered by alternative fuels (Figure 4.2). Fort Carson has a Compressed Natural Gas Station located at Building 250 on Chiles Avenue. A map of fueling locations for alternative fuels along the I-25 corridor may be downloaded from http://www.naturalfuels.com/fuel_I25.htm.

Cooperation with Ride Finders – DECAM is working with Ride Finders to create carpools for Installation users. An article was placed in the Mountaineer in late 2001 and Ride Finders developed a profile sheet specifically for Fort Carson users. Response has been limited; current gasoline prices do not provide sufficient incentives to soldiers and civilians to carpool on the Installation. In addition, many people still want the convenience afforded by driving their own vehicles.

M1 Tank Air Filter Cleaning Program – DECAM purchased and distributed two M1 Tank air filter-cleaning systems. The systems are being used at the Installation and overseas. It is anticipated that gas mileage on tanks may increase due to more frequent cleaning of air filters.

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Installation Shuttle – Fort Carson runs a shuttle service to common areas. This service is advertised in the Mountaineer and in the Pollution Prevention Newsletter. Statistics on shuttle use are not gathered and service has been intermittent.

Telecommuting – In an attempt to alleviate air pollution and traffic congestion, a telecommuting program has been proposed for Fort Carson. The potential reduction in the number of vehicle-miles driven has not been estimated.

Clean Cities Program – Fort Carson is a stakeholder in the Department of Energy's Clean Cities Program, which is coordinated locally by the Colorado Clean Air Campaign. Quarterly meetings and special demonstration events are conducted through this program. Through participation in this program, stakeholders have had the opportunity to contribute to the State Implementation Plan, which addresses regional air quality issues, and transportation plans to improve and expand area roadways, transit and pedestrian/bicycle pathways.

City Buses – Despite the tighter restrictions to enter the Installation, soldiers and civilians take advantage of public transportation. The Installation does not currently track the number of commuters that use city buses.

The Realm of Possibility

To become sustainable, Fort Carson is encouraged to identify and plan for innovations that will support the goals established during the Installation Sustainability Workshop. To do this, participants should be exposed to the concepts and technologies that are within the realm of possibility now and in the future. This section provides a glimpse of what can be accomplished with existing technology and what can be expected from developing sustainability approaches.

Community Pattern Transportation

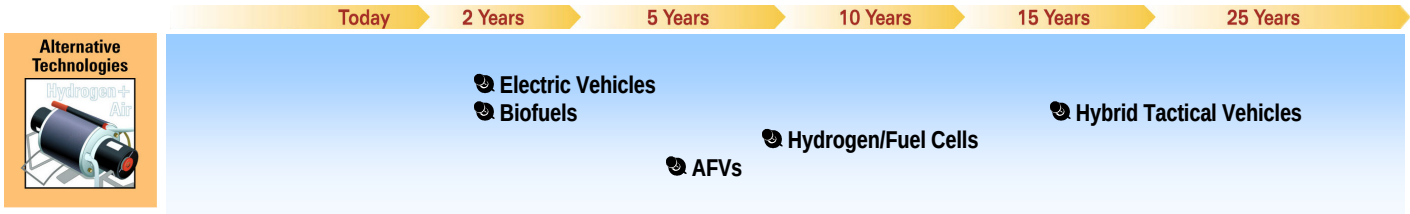
- **Trees for Travel** – Trees for the Future is a nonprofit organization that will plant trees to offset the pollutants caused by air and vehicle travel under the Trees for Travel program. Organizations can keep track of their mileage and send donations to Trees for the Future. Or, large land-owning organizations, such as Fort Carson, can start their own program to offset the vehicle emissions caused by transportation activities (http://www.treesftf.org/travel.htm).

- **Voucher System** – The new Mass Transit Voucher System requires government agencies to pay up to $65/month to cover the costs of employees who take mass transit or van pools to work.

Fuel Efficiency

- **LEV/SuLEV** – Low-emission vehicles (LEV), super-low emission vehicles (SuLEV), and no-emission vehicles are on the market today in response to new laws in California. Many types of alternatively fueled vehicles are also available and should be investigated for possible use.

Alternative Technologies



- **Biofuels** – Biofuels are alcohols, ethers, and other chemicals made from renewable resources (e.g., fast-growing trees, grasses, and algae) and waste products (e.g., agricultural and forestry residues, and municipal and industrial wastes). It is estimated that domestically produced biomass resources could eventually provide at least half of the U.S. light duty vehicle (LDV) fuel requirement. In the not-too-distant future, biomass will be consumed in fuel cells in vehicles and stationary equipment to produce heat and electricity very efficiently, with virtually no pollution and no net increase in carbon emissions. Eventually, high-efficiency biomass power plants will allow any facility to generate its electricity on site.

  According to the Department of Energy, America's fastest growing alternative fuel is biodiesel. Fuel generated from surplus soybean crops can replace diesel in many applications. Biodiesel reduces diesel exhaust by 80 to 90 percent. The Defense Energy Support Center recently issued a long-term contract to purchase biodiesel for fleet vehicles including those of the Marines, Air Force, and Department of the Interior. Plant-based motor oil is in development for use in tactical vehicles.

- **Hydrogen/Fuel Cells** – Hydrogen is not a viable energy source since little free hydrogen is available. Instead, it is viewed by many as the ultimate energy storage and transmission medium. It will be extracted from hydrocarbons, biofuels, and even water, and shipped/piped to another location where it will be directly burned, or indirectly consumed in a fuel cell, producing only energy and water vapor. Iceland, which has rich geothermal and hydrologic resources that can be employed to extract hydrogen from seawater, recently set a goal of becoming the first hydrogen economy. Iceland New Energy, a consortium that includes Daimler Chrysler AG, Norsk Hydro AS of Norway, Royal Dutch Shell Group, and a Reykjavik-based venture capital fund, has launched projects aimed at promoting the hydrogen economy in Iceland. Three buses powered by hydrogen fuel cells will be introduced into Reykjavik's

city transport fleet by the end of 2002. A second project will begin replacing conventional chemical batteries with fuel cells in stationary power structures that are not currently on the regular electric grid.

Fuel cells convert fuel to power three times more efficiently than internal combustion engines; they also allow for a greater range of travel than electric vehicles and do not pollute at the point of use. Every major automobile manufacturer in the world is investing in fuel cell technology, and the Department of Energy supports fuel cell research and development.

- **AFVs –** Alternative fuel vehicles (AFVs) are available on a limited basis now, but it will be a few more years before they truly begin to capture market share in the public and private sectors. Honda is working on a zero-emission vehicle that uses fuel cells for power. The state of California will now give up to $9,000 in rebates to people who buy super-low emission vehicles (SuLEVs). With lower per-mile costs associated with fueling larger fleets, city bus fleets and commercial fleets are prime candidates for alternative fuels such as compressed natural gas. Colorado Springs Utilities runs over 90 vehicles on natural gas, reducing carbon monoxide emissions by 75 tons and nitrogen oxide emissions by 2,772 pounds per year. The General Services Administration (GSA) can provide a number of AFV options. See http://www.afdc.doe.gov/afvehicles.html and http://www.csu.org/environment/energy/vehicles.html for more information.

- **Hybrid Tactical Vehicles** – The Army's National Automotive Center is currently partnering with private firms to develop hybrid-electric systems for military tactical and combat vehicles. This type of system would save fuel and reduce air pollution.

- **Electric Vehicles** – The Advance Research Projects Agency established the Hawaii Electric Vehicle Demonstration Project to facilitate further applications of electrical vehicle technologies for commercial and military applications. The potential for creating jobs, broadening the use of electric and other alternatively fueled vehicles, developing infrastructures to support those vehicles, and maximizing the number of alternatively fueled vehicles on the road increases with partnerships of this type.

Fort Carson 25-Year Goals for Transportation

To be determined by Fort Carson Command and staff, as advised by members of the local and regulatory communities, at the Installation Sustainability Workshop on 4-6 September 2002.

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